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I, MARIO PERUSSICH, ASSISTANT DIRECTOR PATENT SERVICES, hereby certify that the annexed is a true copy of the Provisional specification in connection with Application No. PO 8497 for a patent by SILVERBROOK RESEARCH PTY LTD filed on 11 August 1997.

I further certify that the annexed specification is not, as yet, open to public inspection.

WITNESS my hand this Nineteenth
day of June 1998

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ASSISTANT DIRECTOR PATENT SERVICES

P/00/009
Regulation 3.2

AUSTRALIA
Patents Act 1990

PROVISIONAL SPECIFICATION

AUSTRALIAN	
PROVISIONAL No.	DATE OF FILING
P08497	11AUG.97
PATENT OFFICE	

Application Title: Image Processing Method and Apparatus (ART34)

The invention is described in the following statement:

GH REF: 23975DV/PJT

Image Processing Method and Apparatus (Art 34)

Field of the Invention

The present invention relates to digital image processing and in particular discloses A Camera System
5 Having Motion Deblurring Means.

Further the present invention relates to the field of digital image cameras and in particular discloses a camera system having motion blur compensating means.

Background of the Invention

10 Motion blur in the taking of images is a common significant problem. The motion blur normally occurs as a result of movement of the camera while taking the picture or otherwise as a result of movement of objects within an image.

15 As a result of motion blur, it is often the case that the image taken is non optimal.

Summary of the Invention

It is an object of the present invention to provide a camera system having the ability to overcome the effects of
20 motion blur.

In accordance with the first aspect of the present invention there is provided a camera system for outputting deblurred images, said system comprising;

an image sensor for sensing an image; a velocity
25 detection means for determining any motion of said image relative to an external environment and to produce a velocity output indicative thereof; a processor means interconnected to said image sensor and said velocity detection means and adapted to process said sensed image
30 utilising the velocity output so as to deblurr said image and to output said deblurred image.

Preferably, the camera system is connected to a printer means for immediate output of said deblurred image and is a portable handheld unit. The velocity detection means can
35 comprise an accelerometer such as a micro-electro mechanical (MEMS) device.

Brief Description of the Drawings

Notwithstanding any other forms which may fall within the scope of the present invention, preferred forms of the invention will now be described, by way of example only,
5 with reference to the accompanying drawing in which:

Fig. 1 illustrates a schematic implementation of the preferred embodiment.

Description of Preferred Embodiments

The preferred embodiment is preferably implemented
10 through suitable programming of a hand held camera device such as that described in Australian Provisional Patent Application No. PO7991 filed 15 July, 1997 entitled "Image Processing Method and Apparatus (ART01)", in addition to Australian Provisional Patent Application entitled "Image
15 Processing Method and Apparatus (ART01a)" filed concurrently herewith by the present applicant, the content of which is hereby specifically incorporated by cross reference.

The aforementioned patent specifications disclose a camera system, hereinafter known as an "Artcam" type
20 camera, wherein sensed images can be directly printed out by an internal Artcam portable camera unit. Further, the aforementioned specification discloses means and methods for performing various manipulations on images captured by the camera sensing device leading to the production of
25 various effects in any output image. The manipulations are disclosed to be highly flexible in nature and can be implemented through the insertion into the Artcam of cards having encoded thereon various instructions for the manipulation of images, the cards hereinafter being known
30 as "Artcards". The Artcam further has significant onboard processing power by an Artcam Central Processor unit (ACP) which is interconnected to a memory device for the storage of important data and images.

In the preferred embodiment, the Artcam device is
35 modified so as to include a two dimensional motion sensor. The motion sensor can comprise a small micro-electro

mechanical system (MEMS) device or other suitable device
leave to detect motion in two axes. The motion sensor can
be mounted on the camera device and its output monitored by
the Artcam central processor device which is disclosed in
5 the afore-mentioned patent specifications.

Turning now to Fig. 1, there is illustrated a schematic
of the preferred arrangement of the preferred embodiment.
The accelerometer 1 outputs to the Artcam central processor
2 which also receives the blurred sensed image from the CCD
10 device. The Artcam central processor 2 utilises the
accelerometer readings so as to determine a likely angular
velocity of the camera when the picture was taken. This
velocity factor is then utilised by a suitably programmed
Artcard processor 2 to apply a deblurring function to the
15 blurred sensed image 3 thereby outputting a deblurred output
image 4. The programming of the Artcard processor 2 so as
to perform the deblurring can utilise standard algorithms
known to those skilled in the art of computer programming
and digital image restoration. For example, reference is
20 made to the "Selected Papers on Digital Image Restoration",
M. Ibrahim Sezan, Editor, SPIE Milestone series, volume 74,
and in particular the reprinted paper at pages 167-175
thereof. Further, simplified techniques are shown in the
"Image Processing Handbook", second edition, by John C.
25 Russ, published by CRC Press at pages 336-341 thereof.

It would be therefore obvious to the person skilled in
the art that many different techniques for motion blur
removal can be utilised in the preferred embodiment.
Additionally, other forms of motion sensors may be provided.

30 Once the input image has been deblurred, the image is
then able to be printed out by the Artcam device in
accordance with the techniques as discussed in the afore-
mentioned patent specification.

It would be appreciated by a person skilled in the
35 art that numerous variations and/or modifications may be
made to the present invention as shown in the specific

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embodiment without departing from the spirit or scope of the invention as broadly described. The present embodiment is, therefore, to be considered in all respects to be illustrative and not restrictive.

We Claim:

1. A camera system for outputting deblurred images,
said system comprising:

an image sensor for sensing an image;

5 a velocity detection means for determining
any motion of said image relative to an external environment
and to produce a velocity output indicative thereof;

a processor means interconnected to said
image sensor and said velocity detection means and adapted
10 to process said sensed image utilising the velocity output
so as to deblurr said image and to output said deblurred
image.

2. A camera system as claimed in claim 1 wherein said
processor means is connected to a printer means for
15 immediate output of said deblurred image.

3. A camera system as claimed in any previous claim
wherein said camera system is a portable handheld camera
device.

4. A camera system as claimed in any previous claim
20 wherein said velocity detection means comprises an
accelerometer.

5. A camera system as claimed in claim 4 wherein said
accelerometer comprises a mircro-electro mechanical device.

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Dated this 11th day of August 1997

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Silverbrook Research Pty Ltd

By their Patent Attorneys

GRIFFITH HACK

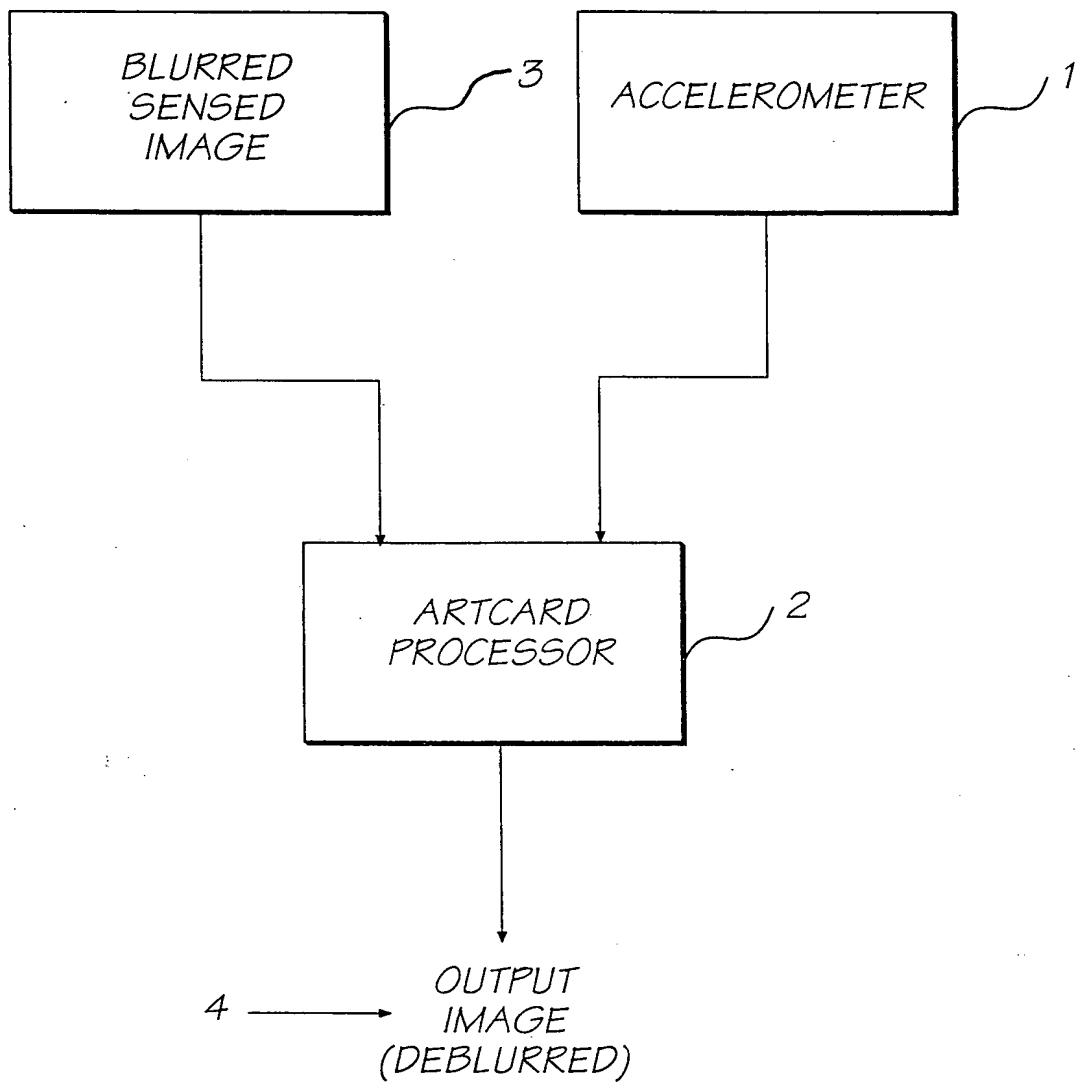


FIG. 1

Abstract

A camera system is disclosed having the ability to overcome the effects of motion blur. The camera system includes an image sensor; a velocity detection means such as a MEMS
5 accelerometer for determining any motion of the image relative to an external environment; a processor means interconnected to the image sensor and the velocity detection means and adapted to process the sensed image so as to deblurr the image and to output the deblurred image to
10 a printer means.